**Portland Harbor Model Review Timeline**

The following bullets identify the different model reviews performed and the approximate time period of the review.

1. 2004 – Reviewed the first hydrodynamic model of the Lower Willamette River (LWR) developed by Tetra Tech who was a subcontractor to West Consultants, Inc. Most significant comment made was that the model domain was insufficient as it did not include a long reach of the Columbia River.

2. 2005 - Reviewed the second version of the hydrodynamic model and the first version of the sediment transport model of the Lower Willamette River (LWR) developed by Tetra Tech who was a subcontractor to West Consultants. The review identified several problems with the sediment transport model formulation, including the incorrect use of SEDFLUME data. Also commented that the very short reach of the Columbia River that was added to the grid at the confluence with the LWR was too short as both the upstream and downstream boundary conditions had to be extrapolated long distances from the gaging stations where the flows and stages were recorded.

3. Spring 2009 – Participated in webinar in which Anchor QEA (AQ) presented their revised sediment transport model of the LWR that used a version of the SEDZLJ sediment bed model. They used the same model grid that Tetra Tech did in their 2005 sediment transport model.

4. Summer 2009 – Participated in follow-up webinar/conference call on AQ's sediment transport model. During this call issues were identified that required AQ to perform additional analysis and model simulations.

5. September 2009 – Participated in a meeting at the AQ office in Mahwah, NJ (Kristine Koch participated via conference call) to discuss the additional analysis and model simulations that AQ performed. No model approval was given as the model was not fully calibrated or validated at that time. The attached file (Sed Trans_ 2009-08-25 Model Devel Cal.pdf) was presented at this meeting. The attached memo (2009-09-28 LWG STM Group Meeting Memo.pdf) written by AQ summarized the items that were discussed during this meeting.

6. Spring 2010 – Participated in webinar in which AQ presented their contaminant transport and fate model of the LWR. Several issues were identified and discussed during this webinar/conference call.

7. Summer 2010 - Participated in follow-up conference call in which AQ discussed the issues that were identified and discussed during the previous webinar/conference call. More issues were identified that required AQ to perform additional analysis and model simulations.

8. September 2010 – Participated in a meeting at the AQ office in Syracuse, NY to discuss the additional analysis and model simulations that AQ performed. I cannot remember if Kristine or Chip participated in this meeting via conference call. No model approval was given as the contaminant fate model was not fully calibrated or validated at that time.

9. Per EPA orders, AQ transferred the LWR hydrodynamic and sediment transport model to USACE (see attached memo "EPA Model XFer Memo.pdf").

10. ERDC performed the review of both the hydrodynamic and sediment transport model as described in the "Outline of Procedure used for Sediment Transport Model Review.doc".

11. The limitations of the AQ model framework that resulted in the excessive net sedimentation in certain reaches of the LWR were described to EPA in ~ November 2012 (I am not certain about this date).

12. ~ Spring 2013 – Participated in conference call/webinar between EPA and the LWG in which AQ discussed the findings of my model review. They also presented limited results from some quasi-linked hydrodynamic and sediment transport modeling they performed.

13. December 2014 – Reviewed the report by Dr. David Jay at Portland State University on his review of the modeling performed by AQ. A memo that listed the comments from my review was sent to Kristine Koch on December 22, 2014.

14. October 2015 – Initiated the development of a new modeling system for the LWR – Portland Harbor Superfund Site.